HOMEBREW COMPUTER CLUB NEWSLETTER

Robert Reiling, editor □ Post Office Box 626 □ Mountain View, CA 94042

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MEMBER MICROCOMPUTER SYSTEMS

A quick survey of members attending the October 15, 1975 club meeting revealed that 38 systems are up and running. Distribution as follows: ALTAIR 8800 - 22, other 8080's - 3, 8008's - 5, 6800's - 2, 6501/2's - 2, others - 4. About 80 people attended this meeting.

Other news discussed during this meeting included TI's new microprocessor - 16 bit, 64 pin, N-MOS, multiply and divide instructions, $150 - $200; Nationals SCAMP - like MOS Technology 6502; Denver Digital Group's new TV display; Processor Technology's new TV display; and the Dazzler color TV display.

MEETING - OCTOBER 29, 1975

More discussion of BASIC and the latest version available. ALTAIR 3.1 is apparently the latest release.

John Schulein, telephone (408) 257 0975 San Jose, will keep a master tape library for the Club. Please give John a copy of your checked out tapes so that he can help out others needing programs. A specification or at least some background documentation will be essential for John and users.

M&R Enterprises demonstrated their new modem designated the Penney Whistle 103. It is capable of originate and receive modes. Available about the end of December. Also, they expect to have joy sticks in early January.

Robert Baer is handling group buy items for members who want to save some money or just get some hardware as well as save some money.

Lots of news at the meetings as you can tell from these notes. Everyone is invited who is interested in computers for the hobbyist. About 120 attended this meeting. Please turn to page six for the meeting schedule.

CORRECTION

We had an error in Eric Dollard's telephone number in the last issue. The correct contact number is (415) 864 8663. Eric needs help with lots of radio transmission and reception equipment for a data transmission system.

MICROCOMPUTER SHOW NOVEMBER 18, 1975

The 1975 Western Microcomputer Show will be held Tuesday, November 18th at the Cabana Hyatt House, Palo Alto, CA. The one-day event will exclusively feature microcomputer products and related products and services for an estimated 3,000 to 5,000 attendees.

GORDON FRENCH'S NON-BINARY GAME TRY COUNTER

I'VE WRITTEN A LITTLE COUNTER THAT I NEEDED FOR A GAME THAT I HAVE "UP" ON MY 8008 BASED HOME SYSTEM. THE ROUTINE IS MUCH SHORTER THAN THE TRADITIONAL BINARY TO ASCII CONVERSION ROUTINES THAT I'VE SEEN BEFORE. THE IDEA BEHIND THIS ROUTINE IS THAT IT BUMPS ITSELF ONCE FOR EACH TIME THAT YOU CALL IT. BY A LITTLE CAREFUL ARRANGING AND PLACEMENT, YOU CAN MAKE IT ANY CONVENIENT LENGTH AND YOU WILL NOT FIND YOURSELF HAVING TO WORRY HOW YOU CAN KEEP TRACK OF MORE THAN 256-(DECIMAL).

THERE IS ONE SLIPPERY THING THAT I'VE DONE TO SIMPLIFY THE ROUTINE, AND THAT IS THAT I'VE DEDICATED THE TOP OF ONE PAGE TO HOLD THE FOLLOWING CONSTANTS:

LOCATION	OCTAL CONTENTS	IS AN ASCII
052000/	040	SPACE
052001/	061	1
052002/	062	2
052003/	063	3
052004/	064	4
052005/	065	5
052006/	066	6
052007/	067	7
052010/	070	8
052011/	071	9
052012/	060	0

YES YOU ARE READING IT CORRECTLY THE STRING BEGINS WITH SPACE AND ENDS WITH ZERO. IF YOU DON'T SET THESE CONSTANTS UP IN THE TOP OF SOME MEMORY PAGE IN LOCATIONS 000 THRU 012 THIS ROUTINE WILL DEFINITELY NOT WORK! THIS IS ACTUALLY A TABLE OF ASCII CHARACTERS NECESSARY TO PRINT OUT THE COUNTERS. THE CHARACTERS ARE POINTED TO BY THE POSITIONAL POINTERS. THESE POINTERS I'VE LOCATED AT LOCATIONS 052156 THRU 052161. THEIR INITIAL CONTENT IS SET TO 000. THAT IS, THEY ALL POINT TO THE SPACE CHARACTER IN THE TABLE. SO YOU HAVE:

LOCATION	OCTAL CONTENTS	FUNCTION
052156/	000	THOUSANDS POINTER
052157/	000	HUNDREDS POINTER
052160/	000	TENS POINTER
052161/	000	UNITS POINTER

NOW IF YOU HAD A PRINT ROUTINE THAT LOOKED SOMETHING LIKE:

```
052013/ 006  LAI 377      EXCLUSIVE OR MASK
052015/ 016  LBI 004      LOAD B WITH CHARACTER COUNT
052017/ 251  XRB          COMPLIMENTED B IN A REGISTER
052020/ 310  LBA          RESTORE B COMPLIMENTED
052021/ 010  INB          B NOW SET TO GO TO ZERO WHEN IT'S BEEN
                            INCREMENTED 4 TIMES.  B IS NOW LOOP COUNT
052022/ 056  LHI 052      POINT TO POINTER PAGE
052024/ 026  LCI 156        LEFTMOST BYTE ADDRESS TO REG.C
052026/ 362  LLC            USE AS POINTER INTO CHARACTER TABLE
052027/ 367  LLM            LOOK THRU POINTER TO CHARACTER TABLE
052030/ 307  LAM           GET THE BYTE
052031/ 106  CAL 000000     CALL YOUR ROUTINE TO PRINT CONTENTS OF A
052034/ 020  INC            BUMP THE POINTER POINTER
052035/ 010  INB            BUMP THE LOOP COUNTER
052036/ 053  RTZ            LEAVE IF LOOP COUNTER GOES TO ZERO
052037/ 104  JMP 052026       OTHERWISE LOOP AGAIN
```

YOU COULD HAPPILY PRINT OUT THE FOUR SPACES CONTAINED IN THE COUNTER.

NOW TO THIS WE ADD THE ROUTINE:

```
052123/ 056  LHI 052          POINT TO
052125/ 066  LLI 161             LOW ORDER POINTER BYTE
052127/ 026  LCI 001          SET UP A CONSTANT ONE
052131/ 006  LAI 012          SET UP DECIMAL TEN
052133/ 317  LBM              GET THE POINTER BYTE
052134/ 010  INB              BUMP IT BY ONE
052135/ 371  LMB              RESTORE IT UPDATED
052136/ 277  CPM              WAS IT TEN?
052137/ 150  JTZ 052150         IT WAS TEN
052142/ 140  JTC 052146           IT WAS ELEVEN
052145/ 013  RFZ              NEITHER.  NOTHING MORE TO DO NOW SO LEAVE
052146/ 372  LMC              STUFF A ONE INTO THIS BYTE
052147/ 007  RET                AND LEAVE
052150/ 061  DCL              POINT TO NEXT HIGHER ORDER BYTE
052151/ 104  JMP 052133         AND GO PERFORM TRICKS AGAIN
```

NOW, YOU HAVE A MAINLINE SOMEWHERE AND YOU WANT TO KEEP TRACK OF HOW MANY TIMES YOU HAVE DONE A CERTAIN THING. SO YOU:

```
   .                    (MERRILY WE ZIP ALONG)
   .
PPPBBB/ 106  CAL 052123      BUMP THE TRY COUNTER ONCE
   .
   .
```

OKAY, SAY YOU ARE ALL DONE AND NOW YOU WANT TO PRINT THE COUNTER:

```
   .
   .
PPPBBB/ 106  CAL 052013
PPPBBB/ 066  LLI 156
PPPBBB/ 250  XRA          POINT TO POINTER LOCATION AND CLEAR A
PPPBBB/ 370  LMA          STUFF THOUSANDS COUNT WITH ZERO
PPPBBB/ 060  INL            WHICH PRINTS SPACE.  BUMP POINTER
PPPBBB/ 370  LMA          THEN THE HUNDREDS COUNT
PPPBBB/ 060  INL          HUM
PPPBBB/ 370  LMA          THEN THE TENS COUNT
PPPBBB/ 060  INL          BUZZ
PPPBBB/ 370  LMA          THEN THE UNITS COUNT
   .
   .
```

WHICH WILL RESET THE COUNTERS TO PRINT THE SPACES.

THIS EXAMPLE IS SKETCHY BECAUSE OF TIME AND SPACE, BUT THE ESSENTIALS FOR A RATHER COMPACT COUNTER PRINTER ARE HERE. IF YOU STUDY THE EXAMPLE A BIT THE LOGIC OF IT WILL BECOME APPEARANT. THE THING COUNTS JUST LIKE KIDS DO; WHEN YOU GET TO TEN, YOU BUMP THE NEXT HIGHER COUNTER AND REPLACE THE NINE WITH A ZERO. HOWEVER THIS ROUTINE THEN DOES SOMETHING A LITTLE DIFFERENT. IT THEN ADDS 1 TO THE LAST 10 AND SINCE IT HAS ALREADY ADDED THE 1 TO THE NEXT HIGHER POSITION ON THE LAST PASS THROUGH THE ROUTINE, THIS TIME IT ROLLS THE ZERO BACK TO ONE. IF THIS IS CONFUSING, THINK FOR A MOMENT WHAT YOU DO WHEN YOU ADD 1 TO TEN.

WELL, HAVE FUN. I'M SORRY THAT I CAN'T GIVE AN EQUIVALENT CODE LIST FOR THE 8080, BUT ED HALL WHO LOOKS OVER MY SHOULDER AND CHECKS THE CHECKER SO TO SPEAK IS IN CHICAGO DOING SOMETHING TO A COMPUTER. HOWEVER THE CODE TRANSLATE IS NOT DIFFICULT.

SEE YOU AT THE MEETING. ----GORDON

INTELLIGENT DISPLAY FOR MICROCOMPUTERS - Ray Boaz

Microcomputer data and address busses are usually displayed on a panel by rows of individual LED's, but a trend toward using LED digits for an "intelligent" readout has started. The use of this type of display requires either special software or relatively simple hardware design. I feel that the hardware approach is far better. The software approach will be left to someone with more knowledge on software to report on. With hardware, once it is added it can be used as an aid in later machine operations. An example of how to multiplex (mux) such a display for both octal and hex is presented here.

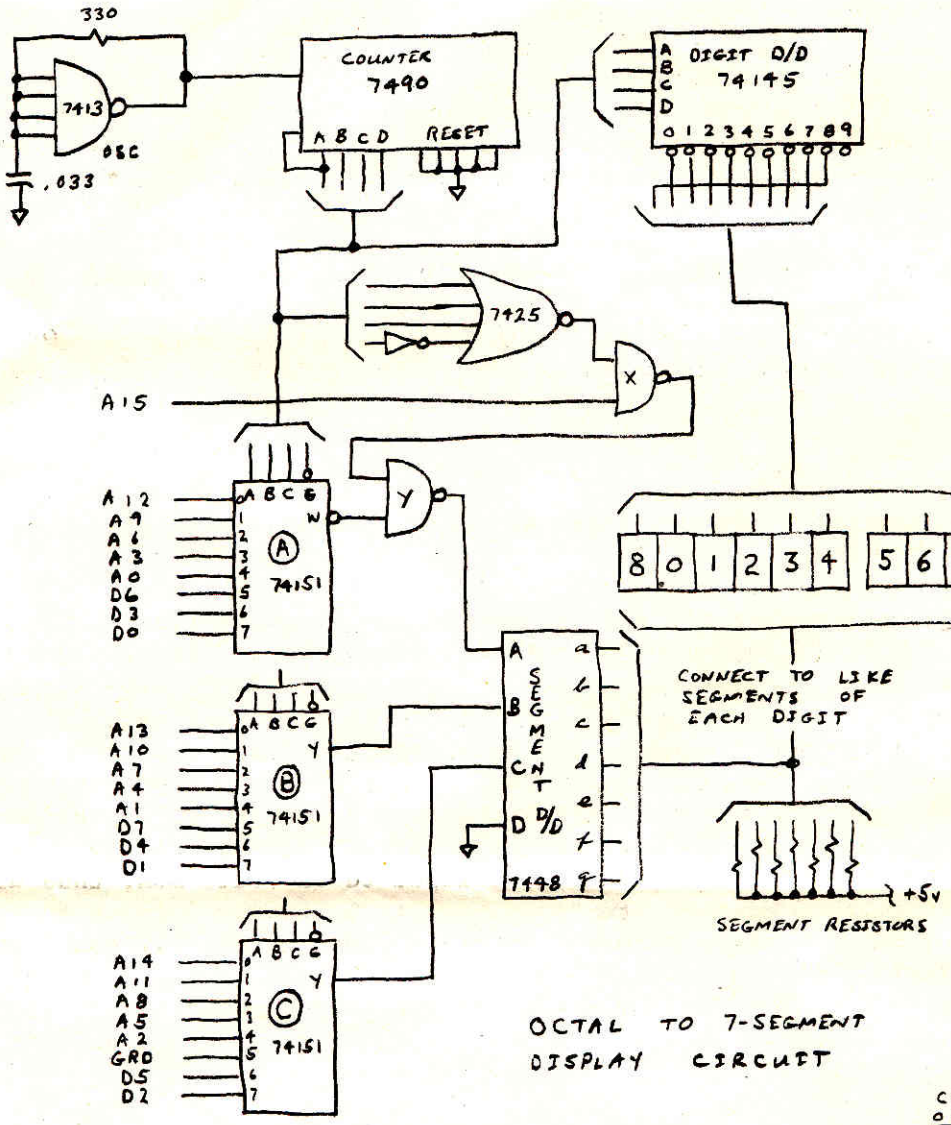
The first comment about multiplexing is --- don't be too concerned about how the mux keeps it all together. Too much thinking about what all goes on in real time gets confusing to all of us. If it gets wired up right, it works just fine. Once the theory is under your belt, the rest is easy. The theory is short and sweet but the details are neat, so away we go.

Understanding the theory of how a mux works is all in "seeing" that it is the counter that runs the show.

The mux consists of six parts, basic and understandable by themselves, but running together not so clear. These parts are: 1- clock source, 2- counter, 3- data multiplexer, 4- digit decoder/driver (D/D), 5- segment D/D, and 6- display. Of course a data source is required and in this case is the microcomputer. Figure 1 is a block diagram of all the parts together. The counter sets the timing to insure that segment data is in sync with the digit it is for. At no time is more than one digit on but each digit is enabled so many times a second all displays appear to be on. The counter cycles through states 0 to Max, then starts all over again. At state 0, digit 0 must be enabled and so must the 0 input to the data mux, thus displaying state 0 data on state 0 digit. At state 1, digit 1 and the 1 input to the data mux are enabled displaying state 1 data. So on to state Max, digit Max and data mux Max are enabled-- you guessed it-- displaying state Max data. Then all over again and again and again---. The digit and segment D/D's simply respond to their set of inputs, which is determined by the counter. The display puts out what it gets from D/D's. That's all there is to it theory-wise.

As presented here detail-wise it's a little longer, so circuit diagrams, tables and waveforms are included. All these are together on one page. This months Newsletter will cover the octal circuit and next months will cover the hex circuit. The block diagram and theory applies to both and will not be repeated.

The clock used in this circuit is a 7413 Schmitt Trigger gate wired as a one gate oscillator running at 70kHz. If a clock source is available from the data source, this may be left out. However, the clock rate to the counter must be high enough to prevent any flicker in the display. Since nine digits are required, a 7490 decade counter is used to run the mux. Nine of the ten states of the counter are used so no reset is required, the counter just overflows and starts over again. Counter outputs A, B, and C go to like inputs on the digit and segment D/D's. Output D goes to input D on the digit D/D, but is used as an inhibit for the segment D/D's during states 8 and 9. The 74151 data muxes decode states 0 to 7 and pass the octal data to the segment D/D. All inputs correspond to Table 1 except for address MSD-A15. A 7425 NOR gate decodes state 8 (1000), enabling A15 data gate X. Since the 74151's are inhibited at this time, 74151 A inverted output being high allows gate Y to pass A15 data, 74151 B and C non-inverted outputs are low so that the segment D/D gets A15-grd-grd as data inputs. (See waveforms). This special decode for A15 is why the digits are arranged 8, 0, 1,..., 6, 7 and not 0 to 8.



OCTAL TO 7-SEGMENT DISPLAY CIRCUIT

DATA MUX	ADDRESS						DATA		
	MSD	5	4	3	2	LSD	MSD	2	LSD
(A)	A15	A12	A9	A6	A3	A0	D6	D3	D0
(B)	GRD	A13	A10	A7	A4	A1	D7	D4	D1
(C)	GRD	A14	A11	A8	A5	A2	GRD	D5	D2

TABLE 1

OCTAL MUX CHART FOR MIN. HARDWARE.

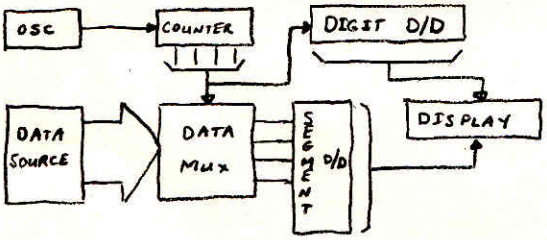
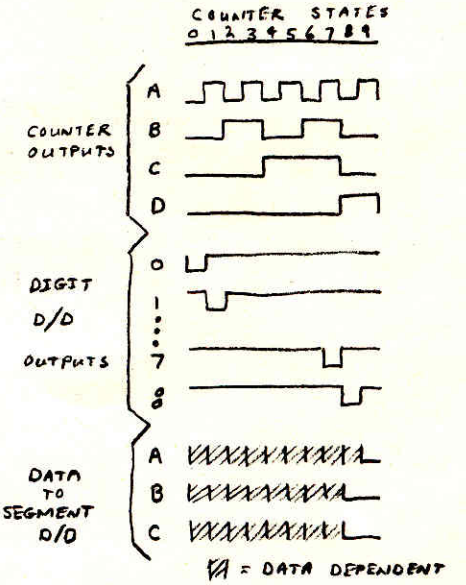


FIG 1

BLOCK DIAGRAM OF A DISPLAY MULTIPLEXER



WAVEFORMS FOR THE OCTAL TO 7-SEGMENT MULTIPLEXER

Counter state 9 is not used. The segment D/D has input D grounded since only the octal numbers 0 to 7 are used. Segment drivers a - g connect to like segments on each display digit. The segment D/D is a common 7448. The digit D/D, a 74145 which can sink current for a whole digit, decodes the counter states and turns on the proper digit 0 - 8. Common cathode displays must be used with this circuit (in my case HP type 5082 multidigit DIP). The resistors on the segment driver lines set the brightness by limiting the current to the segments LED (270 ohms here). Of course, the LED's turn on according to the digit and segment enabling lines. That's all there is to it.

The actual hardware required consists of six TTL MSI chips, several gates, and nine digits of display. If it is desired to latch data/address "on the fly", a set of latches is required for each data mux input. The reduction in panel work and the advantage of error-free readability makes it well worth this kind of hardware investment.

BULLETIN BOARD - Club Members

ALTAIR 8800 time available. Intel type monitor and assembler.
Ed Hughot (408) 244 2155.

PROMs 1702A tested and guaranteed to program. Shipped erased. Delivery off-the-shelf. Solid State Music, 2102A Walsh Ave., Santa Clara, CA 95050.

OPPORTUNITY - Dick Tanski a recruiter with Sanderson Associates is trying to locate a Systems Engineer capable of creating software interface of lab equipment with an Intel 8080. BSEE and Intel programming background preferred. Salary range $18 - 24K. Dick Tanske (415) 989 1900.

NEED 8008-1 for my homebrew computer. Bob Reiling (415) 967 6754.

ALCOVE COMPUTER CLUB in the Boston area would like to exchange information and buy, sell, or swap hardware and software. Contact John P. Vullo, president, 230 Main Street, North Reading Mass. 01864.

TREKSTARS UNLIMITED wants to rent a micro or mini which can be programmed with Star Trek computer games. Plans to offer games on terminal in store (The Federation Trading Post in Berkeley). Stephen Lampen (415) 346 7373.

CYBERCOM owners. I think I have all the schematics to all the boards including the card reader board. There are about 40 pages so it will cost about $4.00 plus tax (or less if alot of people want them) *KEN McGINNIS*

VIDEO DISPLAYS: I have had a good response from my statement about monitors in the last newsletter. There is a strong interest in an 80 character by 24 line display. If I could have 1 month's access to a CRT display (With a microprocessor?) I would get a price for a copy of the P.C. board with and without chips for club members. If you are interested, send your name, opinions, the amount you would pay for what kind of display and anything else of interest. This will NOT compete with the companies who plan to offer displays for ordinary T.V. sets, since this display will require a monitor with about 11.0 M Hz. Bandwidth.
Ken McGinnis, Box 2078, San Mateo, Ca. 94401

CLUB MEETINGS - 7:00PM

Meetings are held every two weeks at Stanford Linear Accelerator Center, Menlo Park, CA. Ask the guard for directions to the meeting location. Dates are November 12th, 26th, etc. Meetings start at 7:00PM.

DATA FILE

00 000 010

CALL COMPUTER K200 ACCOUNT

Homebrew Computer Club members having a current K200 series account with CALL COMPUTER have access to the K200 Library. The library index may be listed, following connection of your terminal to CALL COMPUTER, as follows:

```
GET-$INDEX
RUN
INDEX
```

```
C A L L  C O M P U T E R' S
INDEX OF PROGRAMS

ALL AVAILABLE ENTRIES IN THE K200 LIBRARY
FRIDAY   OCTOBER 31,1975

TO ACCESS PROGRAMS, TYPE 'GET-$' FOLLOWED BY NAME OF PROGRAM.  AN ASTERI
SK
('*') INDICATES THAT PROGRAM IS AVAILABLE BUT NOT CURRENTLY ON SYSTEM.

   NAME         DESCRIPTION

8008          CROSS-ASSEMBLER FOR THE INTEL 8008
8080          CROSS-ASSEMBLER FOR THE INTEL 8080
8080DOC       DOCUMENTATION FOR S8080 CROSS-ASSEMBLER
BASIC2.0      FILE CONTAINING BASIC VERSION 2.0 IN HEXADECIMAL
INDEX         GIVES LIST OF ALL PROGRAMS IN K200 LIBRARY
INTELDISAM    FILE--DISASSEMBLER IN BNPF FORMAT(CALLS TO MONITOR)
NEWS          NEWS FOR HOMEBREW COMPUTER CLUB USERS
NEWS-ENT      PROGRAM FOR ENTERING NEWS IN $NEWS PROGRAM
PEOPLE        GIVES NAME, ACCOUNT, PHONE NUMBER FOR ALL HOMEBREW USERS
WANTADS       BUY-SELL WITH OTHER ACCOUNTS
```

CALL COMPUTER CHARGES

Charges to use the CALL COMPUTER system are based solely on the time on-line to the computer and the amount of storage used during the month. There is no CPU charge or charge for the number of characters input or printed by the machine. A $5.00 minimum service is applicable per month.

ALL PRICES INCLUDE A 10 PER CENT DISCOUNT FOR PAYMENT IN 10 DAYS.

TIME: Based on hours of operation and speed of terminal (in characters per second.)

STORAGE: Per thousand characters per month average usage.

HOURS	10cp	30cp	120cps
12 am - 6 am	.99	1.24	1.98
6 am - 8 am	2.50	2.96	5.00
8 am - 6 pm	3.96	4.96	7.92
(Sat & Sun)	2.96	2.96	6.60
6 pm - 10 pm	2.96	2.96	6.60
10 pm - 12 pm	2.50	2.96	5.00

CHARACTERS	RATE
0 - 300K	$.63
300K - 600K	.54
600K - 900K	.45
900K - 1.2M	.36
1.2M - 1.5M	.27
1.5M - 1.8M	.18

Additional information about CALL COMPUTER may be obtained by calling (415) 964 5331. In the Los Angeles area call (213) 723 2820.

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